



**METHOD AND APPARATUS FOR PRINTING OF A SUBSTRATE FOR  
PREPARING OF PACKAGING BLANKS**

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The invention relates to a method and an apparatus for printing a substrate for preparing packaging blanks, the substrate being divided into copies, these copies having areas for the later application of an adhesive, a printed image being produced on the copy by the application of an ink film and this printed image  
10 being coated with a lacquer.

For lacquering surfaces of substrates in the packaging industry, it is customary to use printing plates, copied for this purpose, as lacquering plates. These are provided with partial recesses, in order to keep the adhesive flaps of the packaging  
15 blanks free of lacquer. This procedure was introduced in the book, "Offsetdrucktechnik" (Offset Printing Technology) by Helmut Teschner, 9<sup>th</sup> Edition, 1995, pages 11 - 43. It is a disadvantage here that special lacquer plates are required, which are expensive to manufacture.

20 It is an object of the invention to develop a method and an apparatus for printing a substrate for preparing packaging blanks, for which specially manufactured lacquer plates are not required.

Pursuant to the invention, this objective is accomplished by the  
25 distinguishing features of the 1<sup>st</sup>, 5<sup>th</sup>, 6<sup>th</sup> and 16<sup>th</sup> claim.

The invention has the advantage that a single lacquer plate can be used for several printing applications. This lacquer plate is free of partial recesses. As a result, the manufacturing costs can be reduced greatly. Since the lacquer plate can be

used for several printing applications, the changeover times can also be shortened. Moreover, only one lacquering unit or lacquer tower is required.

5 The invention is described in greater details by means of examples. In the associated drawings

Figure 1 shows a diagrammatic representation of a sheet-fed offset printing press with three printing units and

10 Figure 2 shows a diagrammatic representation of a sheet-fed offset printing press with five printing units.

#### Example 1

15 As can be seen from Figure 1, this sheet-fed printing press consists of printing units 31, 32, 13, which are disposed in series. In the Figure, three printing units 31, 32, 13 are shown by way of example. The inventive method of the example can also be carried out with only two printing units.

20 A feeding apparatus 1 precedes the printing units 31, 32, 13. The construction and function of the feeding unit 1 are known so that it is unnecessary to go into details here. Each of the printing units 31, 32, 13 consists of a back-pressure roll 21, 22, 25, a plate cylinder 5 and a rubber-covered cylinder 6 (the plate cylinder 5 and the rubber covered cylinder 6 are labeled only in the Figure in printing unit 31).  
25 The direction in which the sheets move is indicated by an arrow. Furthermore, the sheet-guiding cylinders 71, 72, each of which is enclosed by two back-pressure cylinders 21, 22, 25 and which may also be constructed as a turning drum and can be used in face printing and perfecting printing, can be recognized. The back-pressure rolls 21, 22, 25 and the sheet-guiding cylinders 71, 72 are sheet-guiding cylinders  
30 with twice the diameter. The tinting units and damping units, belonging to each

printing unit 31, 32, are not shown here. A dryer 111 may be assigned to the printing unit 31.

5       The printing units 31, 32, shown here, are intended for printing an ink system, which contains printing inks with radiation-drying, usually UV-drying components. It is, however, also possible to use the printing units for printing other inks. These printing inks may, for example, be printing inks, which are typical for offset printing.

10       The printing unit 13, which is intended for coating the surfaces of the copy, which are intended for the application of an adhesive, is disposed after the printing unit 32.

15       In the direction in which the sheets are moving, the lacquer tower 4, which is used for coating the printed image with a layer of lacquer, is disposed after the printing unit 13. This layer of lacquer here can also be dried by radiation. The lacquer tower 4 consists of the back-pressure roll 26, to which a lacquer plate cylinder 8 is assigned. A lacquer plate 81 is clamped on the lacquer plate cylinder 8. A sheet-guiding cylinder 75 precedes the back-pressure roll.

20       An engraved ink transfer cylinder roll 9 is assigned to the lacquer plate cylinder 8 or the lacquer plate 81. A chamber doctor blade 10 is employed for supplying lacquer to this engraved ink transfer roller 9. Furthermore, a dryer 112 is assigned to the lacquer tower 4.

25       A delivery end 12 is provided after the lacquer tower 4. The construction and function of the delivery end 12 are known so that they do not have to be dealt with in greater detail here.

The following inventive method is realized with the apparatus described by means of Figure 1.

5 The printed sheet, put in readiness with the feeding apparatus 1, is taken hold of by devices, the details of which are not described here, and put in motion (in the direction of the arrow). In the printing units 31, 32, the ink is applied with a first inking system over the rubber-covered cylinder 6. The inking system is understood to be a complex of inks, which essentially have the same processing properties.

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The inking system, used in the printing units 31, 32, may contain portions of ink, which cures under radiation (in the example, under UV radiation). Such inks are referred to as hybrid inks. It is, however, also possible to use inks here, which are typically used for offset printing, or also other inks, such as pure UV inks.

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Optionally, the inks can be dried by the dryer 111.

In the inking unit 13, the ink of a further inking system is applied on the surfaces provided for the application of the adhesive. This ink system contains  
20 only a slight number of pigments, if any at all.

In the lacquer tower 4, the whole surface of the substrate is coated with a colorless lacquer. For this purpose a lacquer is used, which has the property of interacting differently with the ink systems applied. This takes place owing to the  
25 fact that the lacquer is absorbed by the coating (second ink system) of the surfaces intended for the application of the adhesive. However, it remains largely on the other surface, which has been provided with inks of the first inking system, and endow this surface with a gloss.

It is a prerequisite for the occurrences of the above effect that the two inking systems differ from one another with regard to their lacquer-absorption capability. The degree of gloss is inversely proportional to the ability of the inking system to absorb lacquer, more lacquer remaining at the surface of ink layers with inking systems of a lower absorptive capacity and a higher proportion of the ink layer being absorbed in ink layers from inking systems of a higher absorptive capacity. The gloss-determining components of the lacquer are taken up by the ink layer. This coating then forms a suitable substrate for the later application of the adhesive.

## 10 Example 2

The construction of the sheet-fed printing press for realizing the method of example 2 corresponds largely to the configuration shown in Figure 1.

15 Instead of a second inking system, a binder customarily used in offset printing, usually varnish, is printed by the printing unit 13.

When the lacquer is applied over the whole surface in the lacquer tower 4, the effect with regard to the absorption of the lacquer by the binder, which is described above, also occurs here.

## Example 3

As is evident from Figure 2, two printing units 31, 32, for printing a first ink system are disposed in this example. A dryer 111 may be assigned to the printing unit 32. Two additional printing units 33, 34, for printing a further ink system and a printing unit 13 are disposed after the printing unit 31, 32. As in the preceding examples, the series of printing units is terminated here also by a lacquer tower 4.

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With this configuration, the following method is realized:

5 The printed image, desired for the corresponding packaging, is applied by the printing units 31, 34. In this connection, a layer of ink, which consists of the inks of a first inking system, is applied in the inking unit 31, 32. This layer may be composed of hybrid inks, hybrid inks being understood to be inks, which contain portions of an ink, which is cured by radiation (especially by UV radiation). These inks are dried in the printing unit 31 by a dryer 111, which is constructed as a UV radiator.

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The printing units 33, 34 are used for printing an ink system, which consists of inks typically employed for offset printing. These inks do not have to be dried by an appropriate device.

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In printing unit 13, a binder, usually a varnish, which is customary in offset printing, is applied on the areas intended for the application of the adhesive.

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Subsequently, the whole surface of the substrate is coated in the lacquer tower 8 with a closed layer of lacquer. The lacquer is absorbed by the coating of the areas intended for the application of the adhesive. The other areas of the copy are coated with different inking systems by the inking units 31, 32, 33, 34. Due to the different lacquer absorptive capacity of the ink systems, the lacquer is absorbed by these areas in different amounts. As a result, different degrees of gloss can be achieved.

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### List of Reference Symbols Used

	1	feeding apparatus
	21 - 26	back pressure roll
5	31- 34	printing unit
	4	lacquer tower
	5	plate cylinder
	6	rubber-covered cylinder
	71 – 75	sheet-guiding cylinder
10	8	lacquer plate cylinder
	81	lacquer plate
	9	engraved ink transfer cylinder
	10	chamber doctor blade
	111-112	dryer
15	12	delivery end
	13	printing unit for varnish